

National Aeronautics and Space Administration



# goddardview

**Volume 6 Issue 3**

## **The Chance to Succeed**

Pg 2

## **NASA Satellite Imagery Keeping Eye on the Gulf Oil Spill**

Pg 5

## **OutsideGoddard: A New Leash on Life**

Pg 10

[www.nasa.gov](http://www.nasa.gov)

## The Chance to Succeed

By Carole Malachi

In a fiercely competitive job market, job seekers these days are doing everything they can to stand out from the pack. For people with physical limitations, a population that currently faces a 15.2% unemployment rate, standing out has never been a problem. The difficult task is getting employers to look beyond differences and see the talent and drive of the individual.

It is for this reason the Alexandria-based non-profit ServiceSource, Inc. has teamed up with commercial and government Agencies like NASA to build awareness and provide valued job opportunities in our community to a variety of talented individuals. ServiceSource has provided administrative services for the NASA Goddard Space Flight Center in Greenbelt, Md. and Wallops Island community for more than 11 years. This valued partnership has given people like Angela Conley of Code 460, who was one of the first two ServiceSource employees to begin work in 1998 on an administrative contract with NASA, the chance to succeed.



Caption: Angela Conley of Code 460.

After a 20-year career with the Washington, D.C. Government, Angela suddenly found herself with a disability as a result of an accident on the job. After an above-the-knee amputation necessitated the use of crutches and a wheelchair, reentering the job market proved to be a difficult task. "For me, becoming an amputee came at a time when society was becoming knowledgeable about how to accommodate individuals with physical differences. Having to deal with uninformed employers was a huge challenge."

During her time at NASA, Angela has continued to learn and excel, always seeking new challenges and opportunities for promotion. In October 2009, Angela's hard work paid off when she was hired by NASA as a full time civil servant employee.

Angela's story is one of tens of thousands of success stories of individuals who have found employment and opportunity through ServiceSource and its partners. Administrative services are ServiceSource's third largest line of business. ServiceSource also has expertise in food service operations, mail center management, document management, packaging and assembly, logistics, and computer recycling services. The organization currently provides quality outsourcing services to 32 Federal Government Agencies including all branches of the United States military.

If you are in need of administrative services, please contact Carole Malachi at 301.286.2656. For more information about ServiceSource, visit:  
<http://www.ourpeoplework.org>. ■

## GoddardView

Volume 6 Issue 3

### Table of Contents

#### Goddard Updates

- The Chance to Succeed – 2
- Hundreds Gather at Goddard's Visitor Center to Celebrate Mankind's Achievements in Space – 3
- New Budget Impacts Goddard Memorial Symposium Discussion – 4
- NASA Satellite Imagery Keeping Eye on the Gulf Oil Spill – 5
- Go into a NASA Clean Room Daily with the *Webb Telescope* via NASA's "Webb-cam" – 6
- Goddard Celebrates Earth Day – 7
- Navigator Technology Takes GPS to a New High – 8
- New Lunar Images and Data Available to the Public – 9

#### Goddard Community

- OutsideGoddard:** A New Leash on Life – 10
- In Memoriam:** Joanne Simpson – 12

Cover caption: Michelle Thaller, Goddard's Assistant Director for Science Communications in the Sciences and Exploration Directorate (Code 600), poses with R2-D2 in the Science on a Sphere Theater. Both helped visitors celebrate Yuri's Night.

Photo credit: NASA/Bill Hrybyk

### GoddardView Info

Goddard View is an official publication of the Goddard Space Flight Center. It is published bi-weekly by the Office of Public Affairs in the interest of Goddard employees, contractors, and retirees. A PDF version is available online at:

<http://www.nasa.gov/centers/goddard/news/index.html>

**Managing Editor:** Trusilla Steele

**Editor:** John Putman

**Deadlines:** News items for publication in the Goddard View must be received by noon of the 2<sup>nd</sup> and 4<sup>th</sup> Friday of the month. You may submit contributions to the editor via e-mail at [john.m.putman@nasa.gov](mailto:john.m.putman@nasa.gov). Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.



## Hundreds Gather at Goddard's Visitor Center to Celebrate Mankind's Achievements in Space

By John Putman

On Saturday, April 10, the night was filled with energy and pulsing beats as hundreds of guests converged upon Goddard to enjoy Yuri's Night, a worldwide party celebrating mankind's achievements in space exploration.

The Goddard Visitor Center was transformed into a night club on a futuristic spaceport. DJ Scientific, otherwise known as Mark Branch, a Goddard engineer, energized the dance floor. At the same time, regional indie rock stars Bellflur filled the Gravity Well with their surreal compositions.

Galactic attire was encouraged and the crowd responded with futuristic interstellar outfits. The party included an intergalactic fashion show for guests to flaunt their creative outfits. There was even a game show, "Are You Smarter than a NASA Astronaut?" The game pitted a team of mere mortals against a real NASA space hero—retired NASA astronaut Roger Crouch, who flew on STS-83 and STS-94, logging more than 470 hours in space—in a game of trivia.

Other special guests included Imperial stormtroopers, Jedi Knights, Tusken Raiders, R2-D2, and other denizens of the Star Wars universe. The stormtroopers provided an intimidating security presence, while the Jedi ensured peace and justice throughout Goddard's corner of the galaxy.

Throughout the evening, visitors were treated to stunning video presentations on the Science On a Sphere projection system. Using Science On a Sphere, Michelle Thaller, Goddard's Assistant Director for Science Communications in the Sciences and Exploration Directorate (Code 600), provided two riveting presentations that showed our solar system in a new light.

Guests mingled with other space fans and communed with the latest in technology, all while feeling the buzz of being at a NASA facility. Goddard's Office of Human Capital Management was there, too, to talk to party-goers about career and internship opportunities at Goddard.

Yuri's Night is a worldwide celebration of the anniversary of mankind's first foray into space and the first flight of the Space Shuttle. Cosmonaut Yuri Gagarin became the first person in space on April 12, 1961. Twenty years later, NASA launched Space Shuttle *Columbia*. ■



Photo credit: NASA/Bill Hrybyk

*Caption: Yuri's Night partiers enjoy the Visitor Center's exhibits.*

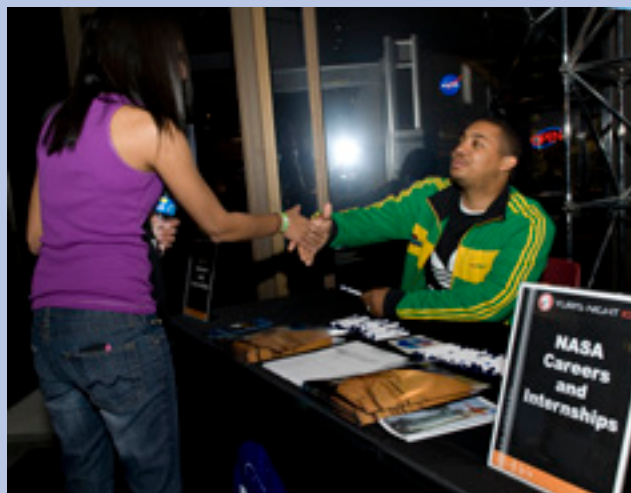


Photo credit: NASA/Bill Hrybyk

*Caption: Representatives from Goddard's Office of Human Capital Management were on hand to talk to those interested in science careers at NASA.*



Photo credit: NASA/Bill Hrybyk

*Caption: Goddard's Visitor Center was full of characters for Yuri's Night.*

## New Budget Impacts Goddard Memorial Symposium Discussion

By Michael Calabrese and Dewayne Washington

The 48th annual Robert H. Goddard Memorial Symposium was held March 10-11, 2010 at the Greenbelt Marriott Hotel in Greenbelt, Maryland. This was the first general professional meeting within the aerospace industry since the recent NASA budget announcement.

"This year's symposium was well timed, just weeks after the announcement of NASA's upcoming budget," said Dr. Harley Thronson, second-year chairperson of the symposium committee. "There was lots of lively discussion, as we had anticipated, and our largest turnout in years."

Rob Strain, Goddard Center Director, provided opening remarks for two days of discussion under the theme "Earth and Beyond: The Next Decades." He also introduced the first-day keynote speaker, NASA Deputy Administrator, Lori Garver.

"The 2011 NASA budget enables NASA to align with the priorities of the Nation including economic development, international leadership, education, and the environment," Garver said. She said the budget that will provide \$6 billion over the next five years for new technology and additional provision for space station operations. According to Garver, the new plan is predicated on commercial capability for cargo and crew, transformational capability with technology demonstrations, and sustainable exploration.

A panel discussion moderated by Alan Ladwig, Deputy Associate Administrator for Public Outreach at NASA, concluded the morning session. Panel participants included NASA Associate Administrator for Science Ed Weiler, Associate Administrator for Exploration Systems Douglas Cooke, and Jaiwon Shin, Associate Administrator for Aeronautics Research. Also on the panel, David Radzanowski, Deputy Associate Administrator for Program Integration, Space Operations Mission Directorate, stated the additional \$2 billion in the 2011 budget will allow the International Space Station to operate productively for the next five years.

Luncheon speaker Jeff Greason, president of XCOR Aerospace and member of the Review of Human Spaceflight Plans Committee spoke of an inadequate budget for NASA's Constellation Program. "It was designed for a budget twice what it got," Greason said. He outlined a strategy based on available technology as prerequisite in determining future exploration destinations including Mars.

The afternoon session included former astronaut Brewster Shaw of The Boeing Company, providing the first day wrap-up. He stated the 2011 budget is not the exit for human spaceflight but provides enabling technology to continue and sustain human spaceflight.

Second-day keynote speaker Bobby Braun, NASA's Chief Technologist, described a new technology program recommended in the Augustine Report. He described NASA's technology efforts as a major component of the Nation's innovative engine.

Robert Jacobs, Deputy Associate Administrator for NASA Public Affairs moderated a media discussion entitled, "Exciting and Informing the Public." The panel of mostly journalists spoke of declining resources and media dedication to the reporting of space and science news. They also challenged what they consider newsmaking events. "You've already been to the Moon but if you were to go to an asteroid, now that would be news," said Jeff Foust of *The Space Review*.



*Caption: Robert Jacobs, Deputy Associate Administrator for NASA Public Affairs, moderates a media panel discussion.*

Day two luncheon featured Elizabeth Robinson, NASA Chief Financial Officer, providing detailed information about the 2011 budget. Afternoon highlights included a panel discussion entitled "Science and NASA's Human Space Flight Program" chaired by *Hubble* astronaut John Grunsfeld. Afterward, a panel of representatives from the European, Indian, Japanese, and Chinese space agencies presented for their country "International Goals for Space."

The final presentation featured a highly interactive panel. "Space and Global Climate Change" emphasized the importance of independent and redundant space and ground climate observation systems.

Closing out the symposium, Jim Crocker, Vice President, Lockheed Martin, presented some thoughts about the two-day event written by students attending from the University of Illinois. The students wrote of being inspired by the big picture and compelling topics of space exploration.

"The feedback from our AAS members and attendees indicates that they were blown away by the quality of this year's program," said James Kirkpatrick, Executive Director, AAS. "The timely theme supported a space policy discussion of NASA in transformation with a breadth of topics covered by a diversity of presenters. We also had excellent attendance and I want to thank Harley Thronson and the entire planning team for their outstanding efforts."

Power point graphics and video of the presentations are available at the AAS Web site: <http://www.astronautical.org>. ■

## NASA Satellite Imagery Keeping Eye on the Gulf Oil Spill

By Rob Gutro

NASA's *Terra* and *Aqua* satellites are helping the National Oceanic and Atmospheric Administration (NOAA) keep tabs on the extent of the recent Gulf oil spill with satellite images from time to time. NOAA is the lead Agency on oil spills and uses airplane fly-overs to assess oil spill extent.

A semisubmersible drilling platform called the Deepwater Horizon located about 50 miles southeast of the Mississippi Delta experienced a fire and explosion on April 20, 2010. Subsequently, oil began spilling out into the Gulf of Mexico and efforts to contain the spill continue today. NASA's *Terra* and *Aqua* satellite imagery has captured the spill in between cloudy days. NOAA used data from the Moderate Imaging Spectroradiometer (MODIS) instrument from the *Terra* satellite on April 26, 27, and 29 to capture the extent of the oil spill, which measured 600 square miles. The MODIS instrument flies aboard both the *Terra* and *Aqua* satellites.

Deepwater Horizon had more than 120 crew aboard and contained an estimated 17,000 barrels (700,000 gallons) of number two fuel oil or marine diesel fuel.

On April 30, NOAA declared the Deepwater Horizon incident "a Spill of National Significance (SONS)." NOAA's estimated release rate of oil spilling into the Gulf is estimated at 5,000 barrels (210,000 gallons) per day based on surface observations and reports of a newly discovered leak in the damaged piping on the sea floor.

NOAA reported on April 29 that dispersants are still being aggressively applied to the oil spill and over 100,000 gallons have been applied. NOAA's test burn late yesterday was successful and approximately 100 barrels of oil were burned in about 45 minutes. NOAA is flying planes over the area and



Photo credit: NASA/Earth Observatory/Jesse Allen

*Caption: On April 29, the MODIS image on the Terra satellite captured a wide-view natural-color image of the oil slick just off the Louisiana coast. The oil slick appears as dull gray interlocking comma shapes, one opaque and the other nearly transparent. Sun glint—the mirror-like reflection of the Sun off the water—enhances the oil slick's visibility. The northwestern tip of the oil slick almost touches the Mississippi Delta. This is a close up of that image.*

In the satellite image from April 27, the MODIS image showed that the oil slick was continuing to emanate from the spill location. Individual slicks lay just north of 29 degrees and zero minutes north, where they have been noted in the days before. Oil had spread further east and the edge of the slick passed 87 degrees and 30 minutes west compared to the MODIS image taken on April 26. The April 26 satellite image came from NASA's *Aqua* satellite.

On April 29, the MODIS image on the *Terra* satellite captured a natural-color image of the oil slick just off the Louisiana coast. The oil slick appeared as dull gray interlocking comma shapes, one opaque and the other nearly transparent. The northwestern tip of the oil slick almost touches the Mississippi Delta.

using NASA satellite imagery from the *Terra* and *Aqua* satellites to monitor the spill.

*Terra* is a multi-national, multi-disciplinary mission involving partnerships with the aerospace agencies of Canada and Japan. Managed by NASA's Goddard Space Flight Center, the mission also receives key contributions from the Jet Propulsion Laboratory and Langley Research Center. *Terra* is an important part of NASA's Science Mission, helping us better understand and protect our home planet.

*Aqua* is a joint project between the United States, Japan, and Brazil. The U.S. provided the spacecraft and four of *Aqua*'s six scientific instruments. Goddard Space Flight Center provided the Moderate Resolution Imaging Spectroradiometer and the Advanced Microwave Sounding Unit. ■



## Go into a NASA Clean Room Daily with the *Webb Telescope* via NASA's "Webb-cam"

By Rob Gutro and Robert Garner

How often can you say that you've seen the components of a space telescope being worked on at NASA? The answer is probably "rarely, if ever." However, thanks to Goddard Space Flight Center, that has now changed.

Web cameras in Goddard's largest clean room are now providing daily, live coverage of work being done on components of the upcoming *James Webb Space Telescope*. You could say that they're "Webb-cams" and they provide one image per minute so people can see what happens behind the scenes. Of course, the work happens during regular working hours, so there may not be action on screen all the time.

John Decker, *Webb Telescope* Deputy Project Manager at Goddard was the motivator in getting the "Webb-cam" up and running. "I thought it would be a great way for everyone to see what happens behind the scenes as components of this exciting new space telescope are being tested and coming together here at NASA Goddard," Decker said.

The *Webb Telescope* project is managed at Goddard, and several components of this next generation space telescope are already in a clean room here.

The *James Webb Space Telescope* is the next-generation premier space observatory, exploring deep space phenomena from distant galaxies to nearby planets and stars. The *Webb Telescope* will give scientists clues about the formation of the universe and the evolution of our own solar system, from the first light after the Big Bang to the formation of star systems capable of supporting life on planets like Earth. The telescope is a joint project of NASA, the European Space Agency, and the Canadian Space Agency and is expected to launch in 2014.

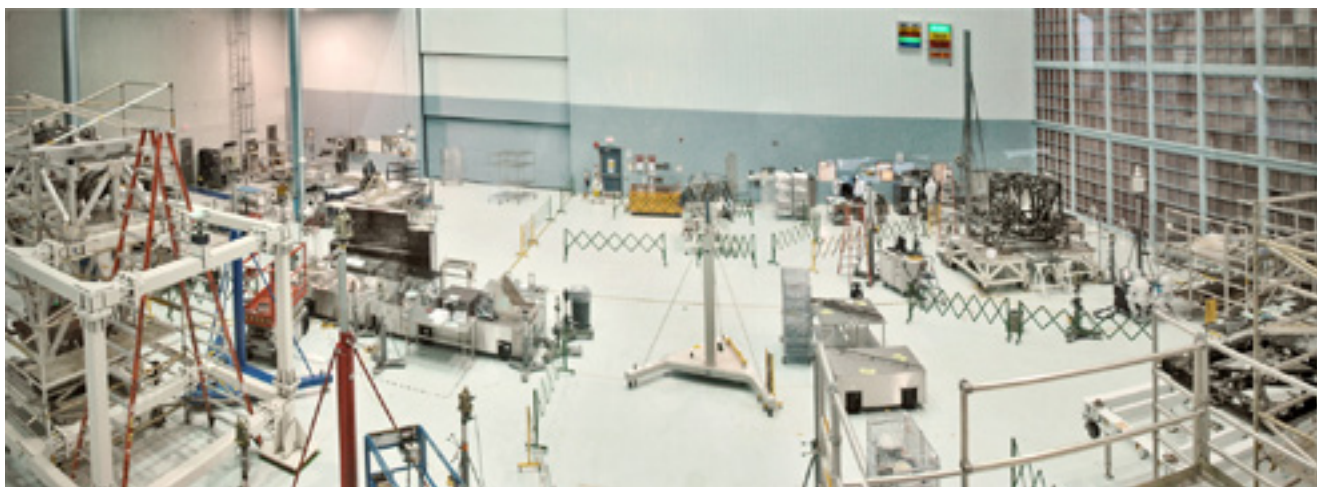
Clean rooms are like operating rooms in hospitals. They are pristine areas kept as free as possible of contaminants that could interfere with delicate technology. There are several clean rooms at NASA Goddard.

Anyone that works in a clean room, such as engineers and scientists, have to wear sterile bodysuits, head covers, gloves, boots, and face masks. It takes about 10 to 15 minutes to get dressed before entering, and it's important because even one speck of dust or a fingerprint could severely damage the sensitive telescope components and instruments. Clean rooms act to filter out these harmful contaminants through a unique ventilation system and an entire wall of air filters.

The clean room ventilation system circulates almost one million cubic feet of air every minute through 9,000 square feet of HEPA filters located along one wall. The HEPA filters are specially designed to last several decades. All of these features provide the largest Goddard clean room with a Class-10,000 rating. That means any cubic foot of air in the clean room has no more than 10,000 particles floating around in it larger than 0.5 microns. A micron is one-millionth of a meter, and typical "outside" air has millions of such particles. A human hair is between 20 and 200 microns wide.

The advantage to the Webb-cam is that the average person doesn't need to do a micron-type clean up and spend time donning protective gear. Anyone can sit at their computer and see what's going on, no matter what they're wearing.

To access the "Webb cam," visit: <http://www.jwst.nasa.gov/webcam.html>. To find out more about the *James Webb Space Telescope*, visit: <http://www.jwst.nasa.gov>. For more information about the Goddard High Bay clean room, visit: [http://www.nasa.gov/mission\\_pages/hubble/servicing/series/cleanroom.html](http://www.nasa.gov/mission_pages/hubble/servicing/series/cleanroom.html). ■



Caption: This panorama shows the inside of Goddard's High Bay Clean Room, as seen from the observation deck.

Photo credit: NASA/Chris Gunn

## Goddard Celebrates Earth Day

By Trusilla Steele

Goddard recognized Earth Day's 40th Anniversary with several events throughout the month of April. Dr. Nancy Maynard, Senior Research Scientist began the activities on April 15 with her presentation, "Climate Change: Indigenous Perspectives and Solutions." Dr. Maynard's discussion identified ways NASA can partner with indigenous communities to address the impacts of climate change and contribute to their response and adaptation strategies.

Employees were intrigued as they toured the Earth Science Mission Operations facility in Building 32 on April 20. The tour showed the benefits of Goddard's Earth Science satellites that provide essential information for weather and environmental forecasting. The tour also took a behind the scenes look at the heart of the repository for Earth Science data that is disseminated worldwide.

Goddard's Earth Day acknowledged the Exploration Sciences Building's (34) Gold LEED (Leadership in Energy and Environmental Design) rating from the U.S. Green Building Council by having activities throughout the day. The event began with opening remarks from Dave Larsen, Project Manager for Building 34.



Photo credit: NASA/Dorota McCallum

*Caption: TDave Larsen, MaryEllen Ramsey, Jerry LeFever, and Sean Evans stand in front of the Gold LEED plaque at the dedication event held in Building 34 on Earth Day.*

Eugene Mszar, Design and Construction Program Manager at NASA Headquarters, provided an overview of NASA's sustainable properties across the Agency. There are 13 NASA buildings with LEED ratings. Of these 13, four have Gold ratings. In addition, there are 10 NASA buildings under construction or major rehabilitation that are registered to receive a Silver, Gold, or Platinum ratings. These sustainable buildings receive such ratings by utilizing innovative ways to use and reduce resources. Such unique features include the use of solar panel rooftops and parking lights, efficient HVAC systems, and reusing deconstructed materials.

Some of Building 34's unique sustainable features include energy performance that is 30.1% better than the average energy code compliant building, zero CFC-based and HCFC-based refrigerants used in the facility, 88 percent of construction waste diverted from the landfill, office doors partially composed of wheat straw, more than 38% of the project's building materials manufactured and extracted from within 500 miles of Greenbelt, and reduction of the overall impact to the site through proper stormwater management and use of lightly colored pavements and roofing materials to reduce heat island effects.

Alan Binstock, Goddard's Master Planner, shared the Center's sustainable actions and future projects, including the installation of wind turbines at Wallops and the geothermal energy project near Building 25 in Greenbelt. At the Greenbelt facility, a rain garden was recently installed near the Building 32 parking lot to allow stormwater to infiltrate the soil and be absorbed by plants instead of gushing directly into the stormwater system.

Goddard is embarking on a renewable energy project to install a geothermal heat pump at Building 25. Currently, there are 4,740 feet of failing steam, condensate, and chilled water lines leading up to the building and air-conditioning units, which all need to be repaired or replaced. A cost-effective and sustainable approach is to take advantage of a heating and cooling source right at the building. A geothermal heating system will both heat and cool the building by taking advantage of the heat stored within the Earth. It is a clean, reliable, sustainable, and local energy source.

The presentations were followed by the unveiling of the Gold LEED plaque which is mounted in the lobby of the Exploration Sciences Building (34). Attendees then enjoyed cake sponsored by the NASA Federal Credit Union. The day concluded in the afternoon with building tours that were given by Dave Larsen. Tour visits included a review of some of the Building's sustainable features and other unique building functions as well as stops to unique labs, special utility corridors, and laser rooms.

For more information on past and future Green Team activities, visit: <http://earthday.gsfc.nasa.gov/index.cfm>.

For more information on Goddard Energy Conservation, visit: <http://energy.gsfc.nasa.gov>. For more information on waste reduction and recycling at Goddard, visit: <http://recycle.gsfc.nasa.gov>. ■

## Navigator Technology Takes GPS to a New High

By Lori Keesey

GPS navigational devices are as ubiquitous as cell phones, freely used by commercial and government users alike to determine location, time, and velocity. These tools, however, are only as good as the signals they receive. Now, NASA engineers have found a way to improve the reception of those signals.

GPS, which stands for Global Positioning System, is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS originally was intended for military uses, but in the 1980s, the Government made the system available for civilian use. GPS is available to users worldwide who need accurate positioning, navigation, and timing services.

Thanks to a team of engineers from Goddard, spacecraft operating in weak-signal areas—such as geosynchronous orbits where communications and weather satellites typically operate—will be able to acquire and track the weak GPS signals to determine their locations, much like motorists who use GPS to determine where they are. For their work developing the Navigator GPS receiver, the Goddard team was nominated for the coveted NASA “Invention of the Year” award, a prize reserved for NASA employees who have secured patents for their inventions.



*Caption: NASA Goddard's Navigator team developed a new receiver that allows spacecraft to quickly acquire GPS navigational signals in weak-signal areas. The team includes (from left to right): Bill Bamford, Steve Sirotzky, Greg Heckler, Luke Winternitz, and Rich Butler.*

Although millions of people rely on GPS receivers today for terrestrial applications, onboard GPS navigation for spaceflight operations has been much more challenging—particularly for spacecraft operating above the GPS constellation, which is about 20,200 kilometers (12,727 miles) above Earth in an area normally referred to as high-Earth orbit. That is because existing GPS receivers could not adequately pick up the GPS signal, which is transmitted toward Earth, not away from it. As a result, spacecraft above the constellation could not reliably use GPS for tracking and navigational purposes, forcing them to use more expensive ground-tracking assets.

Seeing an opportunity to help lower mission costs, the Navigator team, led by Goddard engineer Luke Winternitz, used Research and Development (R&D) funding to develop algorithms and hardware for a prototype spacecraft GPS receiver that would allow spacecraft to acquire and track weak GPS signals at an altitude of 100,000 km (62,137 miles)—well above the GPS constellation, roughly one quarter of the distance to the moon.

“The R&D investment allowed us to develop the weak-signal Navigator GPS receiver and bring it to fruition,” Winternitz says. “Proof of the value of this investment lies in the explosion of flight opportunities and commercialization ventures that have followed.”

Since its development, the technology has secured flight opportunities on several new missions. Navigator will serve as the primary navigation sensor on NASA's Global Precipitation Measurement (GPM) mission, which will study global rain and snowfall when it launches in 2013.

It is considered the enabling navigation technology for another Goddard-managed project, the Magnetospheric MultiScale (MMS) mission. The mission is made up of four identically instrumented spacecraft that will fly in formation in a very high-altitude Earth orbit, while measuring the 3-D structure and dynamics of Earth's protective magnetosphere. The mission will rely on the Navigator GPS receiver's improved sensitivity to help the satellites maintain their precise orbital position.

The Air Force Research Laboratory at Kirtland Air Force Base, N.M. is planning to use a Navigator engineering test unit in its “Plug-and-Play” spacecraft, an experimental satellite that can be developed and launched within days because it uses components that hook together in a manner similar to how a computer adds drives or printers via a Universal Serial Bus interface.

The Navigator team also has delivered an engineering test unit to the next-generation weather satellite called *Geostationary Operational Environmental Satellites* (GOES-R), which the National Oceanic and Atmospheric Administration plans to launch in 2015. The contractor developing the spacecraft may use Navigator's signal-processing design in the spacecraft's GPS receiver.

Broad Reach Engineering, an aerospace engineering firm that operates offices in Colorado and Arizona, meanwhile, is pursuing a commercial license for the Navigator signal-processing technology. It plans to use the technology to build a GPS unit for a U.S. Government program currently under development. The company also plans to use Navigator to develop other products that could be used in potential commercial satellite programs or scientific missions, says Dan Smith, a Broad Reach Project Manager.

If those successes weren't enough, Navigator proved its mettle during a first-of-its-kind experiment carried out during STS-125, the *Hubble Space Telescope* servicing mission last year. While astronauts rendezvoused with

Photo credit: NASA/Bill Hybyk

Continued on Page 9



## Navigator Technology Takes GPS to a New High

Continued from Page 8

and grappled the *Telescope*, the experiment used radar measurements of GPS signals that were reflected off the *Hubble* to provide range estimates during docking and undocking, proving a key relative navigation sensing technology that could potentially be used in a robotic rendezvous with the Hubble in the future.

"No question. The Navigator team has experienced an incredible level of success," says John Carl Adams, an Assistant Chief of Technology for Goddard's Applied Engineering and Technology Directorate's Mission Engineering and Systems Analysis Division. "I attribute their accomplishment to technical know-how, but also to a healthy entrepreneurial spirit. These guys saw a need and developed a solution, which is now driving down mission costs for civilian and military space programs and extending the range of spacecraft GPS sensing to geosynchronous orbits and beyond."

The team is now looking to further improve the technology. Winternitz and his team are developing the next-generation Navigator receiver—one that can acquire the GPS signal even if the spacecraft carrying the receiver is located at lunar distances. Such a capability would reduce mission operational costs because ground controllers could track spacecraft via GPS rather than with expensive ground stations.

"We expect that the evolution of Navigator's capabilities will open up a host of new applications and funding sources, including exploration and high-altitude science missions," Winternitz says. "Navigator's selling points will continue to be that it can offer better navigation performance in weak-signal and highly dynamic environments." ■

## New Lunar Images and Data Available to the Public

By Nancy Neal Jones and Andy Freeberg

The public can follow along with NASA on its journey of lunar discovery. On March 15, the publicly accessible Planetary Data System released data sets from the seven instruments onboard NASA's *Lunar Reconnaissance Orbiter* (LRO).

"The Planetary Data System is a NASA-funded program to archive data from past and present planetary missions as well as astronomical observations and laboratory data," said Dr. John Keller, LRO Deputy Project Scientist from Goddard. "The purpose of the Planetary Data System is to make available to the public the fruits of NASA-funded research and to allow advanced research on solar system science."

Each of the seven instruments is unique and will provide data in different formats to the Planetary Data System. Much of the data will be in a relatively low level form, not highly processed, which allows researchers to maximize flexibility in working with the data. The instrument teams will also provide higher level data products in the form of maps and calibrated images for the general public.

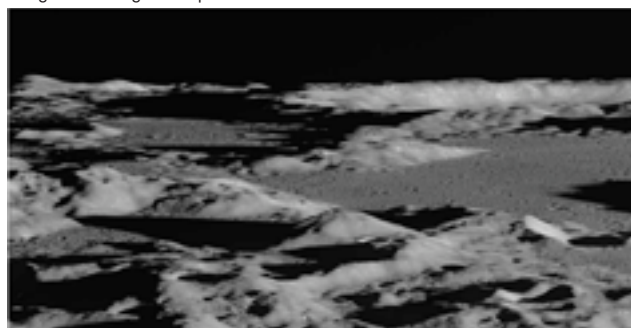


Photo credit: NASA

*Caption: The LRO Narrow Angle Cameras look across the landscape rather than straight down to provide this dramatic view of the northern plains region of the Moon.*

Prior to the formal release of LRO data, the LRO Camera team released several hundred images from the pair of Narrow Angle Cameras onboard the spacecraft. These images were released to give researchers a head start on using the data before the tidal wave of data was unleashed.

"We're able to take advantage of the close proximity of the Moon, compared to other objects in the solar system, to transmit data from LRO back to Earth at a very high rate," said Keller. "The first data release is 55 terabytes. The one-year exploration mission will deliver 130 terabytes of data, enabling a more detailed study of our nearest celestial neighbor. We expect LRO to provide more data than all of the previous planetary missions combined."

LRO is scheduled for a one-year exploration mission in a polar orbit about 31 miles above the lunar surface. During this time, LRO will produce a comprehensive map of the lunar surface in unprecedented detail, search for resources and potential safe landing sites for a potential future return to the Moon and measure lunar temperatures and radiation levels.

To access the Planetary Data System, go to: <http://pds.nasa.gov>. More information can be found about LRO at: <http://www.nasa.gov/lro>. ■

## OutsideGoddard: A New Leash on Life

By Elizabeth M. Jarrell

Retirement can be challenging, even for a dog. On May 15th, nine and one half year old Denver will officially retire from guide dog work. Denver's teammate is Denna S. Lambert, who is the Disability Programs Manager at The Goddard Space Flight Center, National Aeronautics and Space Administration in Greenbelt, Maryland. Denna was born with congenital cataracts.



Photo credit: NASA

*Caption: Denna Lambert and her teammate Denver.*

Convinced that a guide dog was right for her, she contacted The Seeing Eye in Morristown, N. J. The Seeing Eye was founded in 1929 by Morris Frank, one of the first blind people to demonstrate the effectiveness of guide dogs in this country, and Dorothy Harrison Eustis, an American training German Shepherd dogs in Switzerland. Their motto is, "independence and dignity since 1929." Denver certainly did that and more for Denna, who refers to their time together as their "journey."

The Seeing Eye operates its own breeding facility including German Shepherds, Golden Retrievers, Labrador Retrievers, and Golden Labrador crosses. At about ten weeks, the puppies go to their puppy raising family where they are socialized and taught basic obedience for the next year. At about a year, the puppies return to The Seeing Eye where they are then tested for suitability as guide dogs. Those dogs who do not pass are first offered to their puppy raising family. According to Denna, "The lineage on these dogs is that they are genetically bred to work. They just need the right job. They call these dogs 'career change' dogs." She further explains that, for example, dogs must learn to use their eyes before their noses which is contradictory to how a regular dog understands their world. If a potential guide dog continues to use its nose before its eyes, it may then be given to the police to learn drug sniffing or bomb detection work. Another example is that an overly calm dog might be better suited as an assistance dog for someone in a wheelchair."

After Denna contacted The Seeing Eye, they sent an instructor to conduct a full day interview concerning the quality of care she could provide for a dog, her living environment, and her five and ten year goals. The interview also included a test to see how well she could walk with a cane to a specific destination while negotiating street crossings and other obstacles. Denna explains the reason for the test is that "people assume dogs know where you

want to go. But dogs are not a GPS. As the handler, you need to know where your destination is so you can convey simple directions to a dog."

The final part of the day, the instructor and Denna conducted the June walk, which is when the instructor pretends to be a dog named Juno, including using the guide dog harness. The instructor then responds to commands given by Denna and even gets distracted at times and ignores her commands. The purpose of the Juno walk is to simulate how a guide dog can work using various degrees of speed, pull or tension in the harness, and intensity of correction. Denna explains that "pull lets you feel where the dog is going. It's that concept of being connected to the dog through the handle and through the leash." She then had to pass a medical clearance to prove she could walk about two miles a day, a requirement to attend The Seeing Eye's 27 day residential program in Morristown, New Jersey.

Building trust is the reason for the length of the program. Denna explains, "It's a partnership. Denver has to trust that I'll feed him and take care of him. But I also have to trust that he'll stop at stairs and other obstacles because that's what keeps us safe."

In May 2000, Denna began The Seeing Eye's program. Denna found that "class is a unique experience. You all are going through the same emotional roller coaster that can range from experiencing grief over the loss of a retired guide dog to relishing the sense of accomplishment from completing that first walk with your new dog." She arrived on a Saturday, tested out various dogs on Sunday, and received her dog on Monday afternoon. She explains that "the primary concern of the school is to find a dog that matches your needs. That means temperament, pace, and pull in the harness. That's where the interview comes in. It's an art and a science. The instructors are with the dogs about a year so they know the dogs well."

The initial meeting between Denna and Denver did not go well. He was one of the test dogs that first Sunday. Denna recalls, "When I first met Denver, he felt like a big, crazy monster. I didn't like him." In fact, when they were paired the next day, the instructor tricked Denna and told her that Denver was just a relative of the dog she had met the day before.

The Seeing Eye has a ritual transfer where the student calls their new dog away from the instructor. "Denver just sniffed right past me. He didn't care about me at all." When she took him back to her room, Denna remembers that "it was drama." He just cried and cried. If she tried to pet him, he barked back at her.

When Denna met Denver, he was only 18 months old and basically still an overly energetic teenager. The school taught her when and how to give corrections as a means of communicating her expectations when the dogs become distracted or is otherwise misbehaving. They use an escalating scale

Continued on Page 11

## OutsideGoddard: A New Leash on Life

Continued from Page 10

starting with a verbal “no,” then a verbal “pfui” in a harsher tone, and if necessary “just a quick jerk of the lead.” Denver learned Denna’s expectations long ago; she has not had to correct him in many years.

Denna also explains that the dogs do not know a lot of commands. They know left, right, forward, hup-up, steady, come, and no. More importantly, guide dogs are taught concepts such as obstacle avoidance, composure in difficult situations, special relationships, and intelligent disobedience.

The first concept Denna and Denver learned together was obstacle avoidance. They initially learned to just walk together as a team in a residential area. Then they undertook a few simple obstacles such as curbs followed by more complex obstacles such as construction sites with traffic. The key is that she gives the dog a general direction that she wants to go but she still allows the dog to figure out a safe path which may mean turning around. Says Denna, “It doesn’t always seem intuitive to the handler. As a blind person, I may not always know what the obstacle is. That is where trust in the dog’s ability is put into action on a daily basis.”

The most important aspect about guidework is that the dog learns the concept of special relationships which Denna describes as “how the dog moves in an environment that is much taller and wider than him. The dog has to move through the environment by incorporating room for him and for me.” Examples including walking through a cafeteria littered with chairs.

A unique aspect of guide dog training is intelligent disobedience, which is a situation where the dog refuses a command that, if obeyed, would lead the handler into danger. An example is asking the dog to cross a street when the handler does not realize that there is an oncoming car. Denna points out the difference between intelligent disobedience and failure to obey as follows: “Intelligent disobedience happens a lot in street crossings. The dogs get a lot of training in that area. If the dog notices danger, such as the oncoming car, then the dog stands still or pushes back in the harness instead of pulling forward. When that happens, instead of asking him to go forward, I ask him to figure out a safe path or safe time to cross with a ‘hup-up.’”

There are two unusual aspects to Denna and Denver’s team. First, on occasion, friends are allowed to know and call Denver by name. Second, Denna would sometimes let Denver off harness to interact with their friends, which was her way of rewarding him. Denna understands that, “The dogs are bred to be people-oriented, but too much interaction with people while working changes their motivation from guiding to socializing with people, which can endanger the team. That is why the rule is no petting in harness and it

isn’t encouraged to allow others to know the dog’s name.” However, Denna reasons that “Each dog is unique. Denver is not toy oriented, he won’t play with toys. He just likes people. His treat is to interact with people. If he’s done a good job, then I’ll let people pet him. But we had to work up to that.”

She trained Denver sufficiently that he now has a different personality in harness and out of harness. When he is in harness, he knows he has to work and cannot be distracted by other people calling or petting him. When he is out of harness, he can play with people. He knows the difference.

Denver is now the last one working in his litter. Lately Denna has noticed a slowness in Denver’s step. She hears that he is slightly dragging his rear feet which others can barely see. She feels that his pull in the harness is lighter. She knows that he no longer boldly pushes through crowds. According to Denna, “I knew that it is only fair to end our journey with him being my guide. He was giving clear signs that his desire to service as my guide had diminished to the point where he would work for me, but not because he wanted to. And there’s a big difference.”

Deena is gently phasing Denver into retirement. Working dogs are not allowed on sofas and beds, so the first thing Denver did while phasing into retirement was claim her couch. She decided that his official retirement will be May 15, 2010, when Deena will graduate with a master’s degree from The George Washington University. Denver’s final task will be to walk with Deena across the graduation stage.

In recognition of his breeding and years of working, Denna knows that, “Denver still needs to keep active mentally and physically. Sometimes guide work can be really stressful, so I’m looking for a way to give him a sense of purpose while lowering his stress level. That’s the best kind of retirement for him.” Since he loves people and especially children, she is hoping to have him become a therapy dog. For now, she has a dog walker come in every day. She does not want a new dog right now because she wants to focus entirely on Denver, not a new dog. If, however, Denver’s needs become too much for her, Denna will do what is best for him and offer him to an approved retirement home.

Throughout our conversation, Denna kept referring as her time with Denver as “an incredible journey.” Concludes Denna, “There are just so many experiences we’ve had together. Good times and bad times. He’s more than a pet. He has gotten me out of dangerous situations I didn’t even know where there. Now is the beginning of a new phase in our journey together.” ■



## In Memoriam: Joanne Simpson

By NASA Staff

Dr. Joanne Simpson, one of NASA's leading weather scientists of the past 30 years, and a world-renowned atmospheric scientist, died this past March at George Washington University Hospital, in Washington.

Until her recent retirement, Simpson was Chief Scientist Emeritus for Meteorology, Earth Sun Exploration Division at Goddard. She worked with a science group on cloud and mesoscale modeling and studied hurricanes. She has authored or co-authored over 190 scientific articles.

Dorothy Zukor, Deputy Director of Earth Sciences at Goddard, said "Joanne was a joy to work with. In addition to being excited and enthusiastic about her own research, she was always helping students to become scientists. Many are practicing in the field today because of her guidance and encouragement. She has left a true legacy, not only from her own work but for the future of the field."

Joanne was born in 1923, and was a pioneer by the time she was in her twenties. As a student pilot during World War II, she studied meteorology. Joanne then spent the rest of the war teaching meteorology to Aviation Cadets. She earned a B.S. in Meteorology from the University of Chicago. In 1949, Simpson became the first woman to earn a Ph.D. in meteorology, focused her research on clouds, and went on to serve on the faculty of the University of Chicago.

Simpson really made her mark in meteorology in the late 1950s, when she and her former professor, Herbert Riehl came up with an explanation of how the atmosphere moved heat and moisture away from the tropics to higher latitudes. That explanation included the "hot tower" hypothesis that later shed light on hurricane behavior.

Joanne came to NASA Goddard in 1979 as the Chief of the Severe Storms Branch of NASA's Laboratory for Atmosphere. Her arrival at NASA followed an academic career that included the University of Chicago, Woods Hole Oceanographic Institution in Woods Hole, Mass., and the National Oceanic and Atmospheric Administration (NOAA), where she was the head of NOAA's Experimental Meteorology Laboratory in Miami, Fla., for a long period. She also taught as a professor at the University of California at Los Angeles and the University of Virginia, Charlottesville, Va., before coming to NASA.

During her career at NASA, Joanne's research focused on convective cloud systems and tropical cyclones using numerical cloud models and observations. She made integral contributions to several historic NASA field missions, including the Convection And Moisture EXperiment (CAMEX) missions, the Tropical Ocean Global Atmospheres/Coupled Ocean Atmosphere Response Experiment (TOGA COARE), the GARP Atlantic Tropical Experiment (GATE), and the Winter Monsoon Experiment (Winter MONEX).



Photo provided by: Joanne Simpson and the Schlesinger Library

*Caption: The Navy provided a PBY flying boat to the Woods Hole Oceanographic Institute so Joanne Simpson could study tropical clouds. In this photograph she stands with her crew in front of the aircraft.*

In 1986, NASA asked Joanne to lead the science study for the proposed Tropical Rainfall Measuring Mission (TRMM), a satellite to carry both active and passive microwave instruments to accurately measure rainfall across the tropics and subtropics.

Between 1986 and the launch in November 1997, Joanne served first as Study Scientist and then Project Scientist for TRMM, bringing it from concept to reality. TRMM continues to fly today and provide unique surface rainfall and hydrometeor profile data for climate and atmospheric process studies and for real-time operational applications related to convective systems and hurricanes. Joanne often said that TRMM was the most important accomplishment of her career.

Joanne recently inquired about TRMM and was very enthusiastic about TRMM's potential overlap with Goddard's Global Precipitation Measurement (GPM) mission, to be launched in 2013. Dr. Robert Adler, now a senior research scientist at the University of Maryland, College Park, was Joanne's Deputy on TRMM and also TRMM Project Scientist later in the mission, says "Joanne was the heart and soul of TRMM during the pre-launch phase, sharpening the scientific focus of the mission, resolving critical choices related to instruments, orbit, and fighting (and winning) the budget and political battles to get us to launch and beyond. TRMM would not exist if it hadn't been for Joanne."

Joanne had a career filled with awards and recognition of her research. She was elected to the National Academy of Engineering, awarded the Carl-Gustaf Rossby Award (the highest honor bestowed by the American Meteorological Society), presented with a Guggenheim Fellowship, served as president of the American Meteorological Society and received numerous NASA and Goddard awards. In 2002, she was the first woman ever awarded the prestigious International Meteorological Organization Prize.

Joanne's contributions will forever live on in NASA hurricane research and are a tremendous part of meteorological history. ■